

REMARKS/ARGUMENTS

Claim 18 has been amended, and claims 23-25 have been added. Claims 18-25 are now pending in the application. (Claims 1-17 were previously canceled.) Applicants respectfully request reexamination and reconsideration of the application.

Initially, Applicants acknowledge with appreciation receipt of initialed copies of two of the three pages of prior art listings filed with an Information Disclosure Statement dated September 29, 2003. Applicants did not receive, however, an initialed copy of the third page of prior art listings, which lists seven foreign patent publications. Applicants request that the third page also be initialed and returned.

Claims 18 and 19 were rejected as obvious in view of US Patent No. 4,627,161 to Cushman ("Cushman I") and US Patent No. 4,833,776 to Wakamiya et al. ("Wakamiya"). In addition, claims 20-22 were rejected as obvious in view of Cushman I, Wakamiya, US Patent No. 4,533,199 to Feldberg ("Feldberg"), US Patent No. 4,616,414 to Cushman ("Cushman II"), and US Patent No. 6,449,838 to Murakami ("Murakami"). Applicants respectfully traverse these rejections.

Independent claim 18 is directed to an improved method of electrically connecting an electronic device to a substrate. As described in claim 18, the substrate includes a plurality of conductive recesses, each of which extends into the substrate and has a bottom portion that is inside the substrate. As stated in claim 18, the method comprises "passing free ends of a plurality of elongate spring contacts attached to said electronic device into" the "plurality of conductive recesses." A force is applied to the electronic device, which presses the free ends of the spring contacts against the bottom portions of the recesses. That force is the primary mechanism that establishes and maintains electrical connections between the spring contacts and the recesses. Nonlimiting examples of the foregoing are shown in Figures 5A, 5B, and 5C.

The method of claim 18 provides several advantages over the prior art. An example of one such advantage is that the electrical connections established between the electronic component and the substrate (or more precisely between the elongate spring contacts attached to the electronic component and the recesses in the substrate) are readily removed by simply removing the force from the electronic component. In this way, an electronic component can be electrically connected to the substrate and later easily replaced with a different electronic component. Thus, the use of a force against an electronic component to establish pressure-based

electrical connections between the electronic component and a substrate is not a trivial or obvious change from the prior art but represents a significant improvement over the prior art.

Cushman I (US Patent No. 4,627,161) discloses a method in which the leads 32, 34 of an integrated circuit "chip" 30 are inserted into holes 36, 37 that pass through a board 31. As is known, it has long been the practice in electronics fields to press the leads of an integrated circuit chip, such as chip 30 in Cushman I, through holes in a printed circuit board and then solder the leads into place on the backside of the printed circuit board. Cushman I discloses nothing more than this old and well known process, adding only a step of vibrating the printed circuit board as the chip leads are pressed through the holes. (See Cushman I, e.g., col. 1, lines 12-13 and col. 5, lines 28-44.) Moreover, in Cushman I, the leads 32, 34 are pressed all the way through the board 31 such that they exit the backside of board 31 (see Figure 2D). In addition, the force 41 applied to chip 30 is for inserting the leads 32, 34 into holes 36, 37. Once the leads 32, 34 are inserted into the holes, the force is removed. The force therefore does not establish and maintain electrical connections between the leads 32, 34 and the holes 36, 37. Cushman I thus lacks at least two aspects of claim 1: (1) the through holes 36, 37 of Cushman I lack a bottom portion that prevents leads 32, 34 from passing through board 31; and (2) electrical connections between Cushman I's leads 32, 34 and holes 36, 37 in board 31 are not maintained substantially entirely by a force applied to chip 30.

Wakamiya likewise fails to disclose the same two aspects of claim 18 of the present application. As shown in Figures 4G-4P of Wakamiya, leads 4 of an integrated circuit chip 1 are inserted into holes in a printed circuit board 5. As shown in Figure 4P, the leads 4 are inserted through the holes such that the leads 4 extend out of the backside of the printed circuit board 5, after which the leads 4 are bent to hold the chip 1 to the board 5.

Thus, both Cushman I and Wakamiya fail to disclose the following two portions of claim 18 of the present application: (1) "each said recess comprising a bottom portion disposed within said substrate that prevents said free ends from passing through said substrate" or (2) "wherein electrical connections between said elongate spring contacts and said conductive recesses are established and maintained substantially entirely due to said pressing." (See claim 18.)

Moreover, Feldberg, Cushman II (US Patent No. 4,616,414), and Murakami fail to make up for these deficiencies in Cushman I and Wakamiya. Feldberg discloses a connector for terminating a coaxial cable and thus relates only tangentially—if at all—to Cushman I and

Wakamiya. (See Feldberg, Abstract.) In Murakami, cured sealing resin 109—not a force on semiconductor device 105—maintains the electrical connection between bump electrode 107 and mounting pad 103. (See Murakami Figures 2A-2C, and col. 3, lines 29-41.) Cushman II also fails to make up for the deficiencies in Cushman I and Wakamiya.

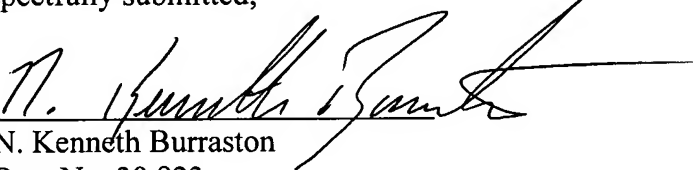
For all of the foregoing reasons, neither Cushman I, Wakamiya, Feldberg, Cushman II, nor Murakami, whether taken singly or in combination, teach or suggest the method of claim 18 of the present application. Therefore, claim 18, and its dependent claims, patentably distinguish over Cushman I, Wakamiya, Feldberg, Cushman II, and Murakami.

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 323-5934.

Respectfully submitted,

Date: June 14, 2004

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